भारतीय मानक
Indian Standard

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खाद्य अनाज भंडारण के लिए उपयोग की जाने वाली एवं उपयोग हेतु अपेक्षित मौजूदा संरचनाओं के सुधार — रीति संहिता

(पहला पुनरीक्षण)

Improvement of Existing Structures Used or Intended to be Used for Food Grain Storage — Code of Practice

(First Revision)

ICS 55.220; 67.060

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Foodgrains, Allied products and Other Agricultural Produce Sectional Committee, FAD 16

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Foodgrains, Allied products and Other Agricultural Produce Sectional Committee had been approved by the Food and Agriculture Divisional Council.

Owing to paucity of proper food grain storage structures, the Government and trade organizations store food grain, in an emergency, in any building which they can easily acquire. Such emergencies have frequently arisen in various parts of the country during the last decade, particularly because of the sudden heavy arrivals of food grain at places where it was not possible to construct storage structures at short notice. Furthermore, even if construction of storage structures was possible, it was not undertaken for the simple reason that they might not have permanent utility. Since structures, thus acquired, are, not essentially built for the storage of food grain, they lack in many essential requirements for such storage, due to which the food grain stored in them is liable to suffer heavy losses. It is, therefore, obvious that in all acquired storage structures, which are not originally constructed for such purpose but utilized for it, either temporarily or on a long term basis, certain measures should be adopted in order that the desired level of proper conditions both in respect of the surroundings of such structures as well as in their constructional features may be maintained.

In addition to this aspect of improvement of existing defective food grain storage structures, the food grain itself has, during handling in transit or storage, to be looked after carefully and in a scientific manner. Likewise, the structures in which food grain is stored have to be of a desired standard. Keeping in view all these various aspects of the subject of conservation of food grain, Bureau of Indian Standards has brought out a series of standards for handling in transit and storage of food grain and also for the construction of food grain storage structure.

With view to assisting in the improvement of existing defective food grain storage structures, this standard Code was first published in 1955. The current revision is being taken up to update the provisions given in the standard in view of the latest practices being followed in this area. In this standard, particular attention has been paid to the fact that while suggesting methods for improvement of existing defective food grain storage structures, it is not either possible or economically feasible to rebuild entirely the whole or part of the storage structure. The various practices given in this standard are, therefore, only of such a nature as could be easily adopted without bringing about any radical change in the storage structure itself. Nevertheless, it is considered that the changes suggested herein, would be adequate to provide sufficient protection to the stored food grain from ravages by insects, dampness or moisture and rats. It may also be mentioned that the intention in prescribing the various practices for improvement and maintenance of each part of the storage structure is to serve as a guide in the selection of such of the practices as may be applicable to the storage structure under consideration.

In this standard, it has been assumed that the work of improvement of the defective food grain storage structure, which will mainly be of the nature of repairs, cleaning, levelling of ground, etc, would be done according to the prevailing Codes and, therefore, the various engineering practices connected with such work have not been given. However, wherever it has been considered desirable to elaborate any such practices, care has been taken to include such elaboration in this standard.

Metric system has been adopted in India and all quantities and dimensions in this standard have been given in metric system.

The Committee responsible for formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

IMPROVEMENT OF EXISTING STRUCTURES USED OR INTENDED TO BE USED FOR FOOD GRAIN STORAGE — CODE OF PRACTICE

(First Revision)

1 SCOPE

This standard prescribes the methods for improvement of existing structures used or intended to be used for food grain storage, both for bag and bulk storage type. It is intended to be chiefly adaptable for Government and trade storage of food grain.

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards indicated below:

IS No.	*Title*
277 : 2018	Galvanized steel strips and sheets (plain and corrugated) — Specification (*seventh revision*)
280 : 2006	Mild steel wire for general engineering purposes (*fourth revision*)
6438 : 1980	Specification for aluminium phosphide formulations (*first revision*)
7247 (Part 3) : 1974	Code of practice for fumigation of agricultural produce: Part 3 Aluminium phosphide
15219 : 2002	Aluminium phosphide powder formulation

3 GENERAL

3.1 Structures having mud floor or mud walls or thatched roof or those situated near river or sea bottom lands subject to flooding or inundations, shall not be used for the purpose of storage of food grain.

3.2 As far as possible, food grain storage structure (FGSS) shall be at least 15 m (preferably 30 m) away from factories dairies, poultry runs, kilns, cattle pens, styes, slaughter houses, hide curing centres or tanneries, garbage dumping grounds, manure pits, sewage pits and disposal plants, and such other places, the close vicinity of which is deleterious to safe storage of food grain.

3.3 In case of inland FGSS, it shall be ascertained that, as far as possible, there is sufficient off street parking and manoeuvring space for vehicles. Likewise, for FGSS situated at ferry heads, docks, etc, care shall be taken to ascertain that sufficient berthing, loading and unloading facilities are available.

4 SITE

4.1 Drainage — The site shall be provided with proper drainage.

4.1.1 All existing pools, ponds and such other low level grounds within a radius of 15 m from the FGSS, where water is likely to accumulate or stagnate, shall be filled up and levelled.

4.1.2 *Drains* — The open drains within a radius of 6 m from the FGSS shall be made of brick or stone masonry or of cement concrete, and shall be plastered smooth. They shall slope towards the natural fall of the ground and shall be connected to an out-fall drain for the ultimate disposal of water.

4.2 Cleanliness — Any garbage, weeds, shrubs and other such things which are likely to have a deleterious effect on the stored food grain shall be removed, and such unhygienic places cleaned up and levelled.

4.2.1 All the branches of trees within a radius of 3 m of the FGSS shall be cut off.

4.2.2 Any lumber or such other articles which may provide either a pathway or jumping ground for the rats so as to enable them to reach the FGSS, shall be removed.

4.3 Rat Burrows — All rat burrows whether inhabited or not by rats in the vicinity of the FGSS or abutting the foundation of the FGSS shall be treated with aluminum phosphide in the form of tablets/pellets. For precautions in handling the material and procedure, please refer IS 7247 (Part 3).

5 FOUNDATION

All pits in the ground abutting the foundation shall be levelled, watered, tamped and brought to the surrounding level of the ground.

6 PAVEMENT

6.1 All round the FGSS abutting the plinth, a pavement 150 cm wide and 15 cm thick of either bricks or stone slabs set in lime or cement mortar, or of lime or cement concrete shall be constructed, if such a pavement does not already exist. The bricks or stone slabs of the pavement shall be cement pointed.

6.1.1 The pavement shall slope outside at 1 in 10.

7 PLINTH

7.1 All cracks and crevices in the plinth shall be repaired.

7.2 All rat holes in the plinth shall be closed with cement concrete mixed with small broken glass pieces roughly 6 mm size (about 1.6 kg of glass pieces to 1 m^3 of cement concrete).

8 FLOOR

8.1 It shall be ascertained that the floor is strong and non-yielding and would not transmit dampness to stored food grain due to seepage of ground moisture.

8.1.1 All cracks and crevices in the floor shall be made up. If the floor has sagged at places, these places shall be dug up and rebuilt so as to bring them in level with the rest of the floor.

8.1.2 All rat holes in the floor shall be closed with cement concrete mixed with small broken glass pieces roughly 6 mm size (about 1.6 kg of glass pieces to 1 m^3 of cement concrete).

8.1.3 If the floor is either not strong and would yield to pressure of stored food grain, or is likely to transmit dampness to stored food grain due to seepage of ground moisture, it shall be remade in the following manner: Dig out the floor to a depth of 40 cm and level this dug out surface. Fill the bottom of this excavation with a 10 cm layer of earth consisting of gritty or gravelly soil, water and tamp it hard. Over this, spread a 10 cm thick layer of coarse sand, and again water and tamp it. Next, lay a layer of 15 cm thickness of lime concrete, then a 6 mm thick layer of bitumen, and finally, 44 mm thick layer of cement concrete. This last layer of cement concrete forms the floor). Lay the floor in alternate panels, not exceeding 3 m × 3 m with their joints filled with mastic. Plaster the floor smooth.

9 WALLS

9.1 All cracks and crevices in the walls or in the plaster of the walls shall be made up.

9.2 The inside surface of the walls shall be plastered smooth with lime or cement plaster.

9.3 The inside edges of the walls and the corners where they meet the floor and the roof or the ceiling shall be rounded off to a radius of at least 50 mm.

9.4 If walls show signs of dampness, the plaster of inside surface of walls shall be removed and a coat of 6 mm thick bitumen applied. The inside surface shall then be re-plastered and the surface rendered smooth.

10 OPENINGS

10.1 Doors — The doors shall be repaired to the extent necessary so that there are no chinks, gaps or spaces in between the door leaves and also that the leaves fit the frame closely.

10.1.1 If the door leaves are made of timber, their lower portions shall be provided with U shaped 0.63 mm thick, galvanized steel sheets (*see* IS 277), up to a height of 225 mm from bottom so as to cover both the inner and outer surfaces of door leaves. Also the two edges of the door leaves shall be covered by additional overlapping strips of galvanized steel sheeting up to a height of 225 mm from the bottom.

10.2 Windows — The windows shall be provided with shutters.

10.2.1 *Shutters* **—** The shutters for the windows shall be repaired to the extent necessary so as to fill up all chinks, gaps or spaces in them and fit closely.

10.2.2 The windows, in addition to the shutters shall be provided with wire netting of 6 mm mesh made of 0.560 mm thick galvanized mild steel wire (*see* IS 280).

10.2.3 In case there are no verandahs, the windows shall be provided with sun shades (*chajjas*) on the outer side of the FGSS.

10.2.4 The window sill shall slope outwards.

10.3 Ventilators — The ventilators shall be provided with sun shades (*chajjas*) on the outer side of the FGSS and their sills shall slope outwards.

10.3.1 If the ventilators have no shutters, wire netting of 6 mm mesh made of galvanized mild steel wire of 0.56 mm diameter shall be provided on all the ventilators. If there are shutters, they shall be repaired to the extent necessary, so as to fill up all chinks, gaps or spaces and also to fit closely.

10.4 Manhole — The manhole shall be provided with an iron cover of suitable dimensions so as to fit tightly with its frame and render the opening completely water-tight.

10.4.1 *Cover* — The cover shall be provided with a locking arrangement. The inside surface of the cover shall be provided with a wooden lining.

10.5 Spout — The spout shall be provided with a shutter.

10.5.1 *Shutter* — The shutter when closed, shall be close fitting so as to render the spout air-tight. It shall be provided with a locking arrangement.

11 ROOF

11.1 The roof shall be repaired to the extent necessary, so that there is no leakage or percolation of water through it.

11.1.1 In case of gabled roof, if there are spaces in between the walls and the roof sheeting, the spaces shall be fitted with wire netting of 6 mm mesh made of galvanized mild steel wire of 0.560 mm diameter. The roof shall project sufficiently outside the walls to prevent rain water coming into the structure.

12 DRAINAGE OF RAIN WATER FROM ROOF

Adequate provision for drainage of rain water from the roof shall be made. If drain pipes are already built, necessary repairs shall be done to them and they shall be properly secured at the off-take as well as to the walls. Their lower ends shall be cut 1.2 m short above the ground level and shoes for directing the water to fall away from the wall, provided to them. Below each drain pipe, a stone slab of suitable dimensions shall be provided on the ground so that the ground area is not scoured due to the water falling through the drain pipe.

13 DISINFESTATION OF EMPTY FGSS

After the FGSS has been improved upon in the manner prescribed under 12 the floor, walls and the underside of the roof (or the ceiling) shall be swept thoroughly clean. It shall then be disinfested by one of the methods prescribed in Annex A, before taking any food grain inside.

ANNEX A

(*Clause* 13)

METHODS FOR DISINFESTATION OF EMPTY FGSS

A-0 GENERAL

A-0.1 Disinfestation of empty FGSS may be done by anyone of the two methods namely, air charging/surface treatment and fumigation.

A-0.1.1 air-charging/surface treatment can be done only of those empty FGSS which can be made reasonably air-tight, while fumigation of only those which can be made perfectly air-tight.

A-0.2 During any one of these two operations, no spectator shall be allowed inside the FGSS.

A-1 AIR CHARGING/SURFACE TREATMENT

Air-charging (including spraying or fogging)/surface treatment of empty FGSS may be carried out using suitable recommended pesticide (for example Malathion) by CIB and RC in recommended doses as and when required.

A-2 FUMIGATION

A-2.1 Fumigant — Aluminium phosphide (IS 6438 and IS 15219)

A-2.2 For the equipment, precautions and procedure, *see* IS 7247 (Part 3).

ANNEX B

(*Foreword*)

LIST OF REFERRED INDIAN STANDARDS

Composition of Foodgrains, Allied Products and Other Agricultural Produce Sectional Committee, FAD 16

Organization	*Representative(s)*
Directorate of Marketing and Inspection, Ministry of Agriculture, New Delhi	J. S. (Marketing) and Agricultural Marketing Advisor (***Chairman***)
Centre of Excellence for Soybean Processing, CIAE, Bhopal	Dr Punit Chandra Dr S. K. Giri (*Alternate*)
All India Food Processors' Association, New Delhi	Shri Sham Baggarry Ms Jyoti Soni (*Alternate*)
CSIR-Central Food Technological Research Institute (CFTRI), Mysore	Dr M. S. Meera Dr V. B. Sashikala
Central Institute of Post-Harvest Engineering & Technology (CIPHET), Ludhiana	Head (Division of Transfer of Technology) Dr D. N. Yadav (*Alternate*)
ICAR-National Rice Research Institute, Cuttack (formerly CRRI)	Dr Awadhesh Kumar Dr (Mrs) Padmini Swain (*Alternate*)
ICAR-Central Tuber Crop Research Institute (CTCRI), Thiruvananthpuram	Director Dr M. S. Sanjeev (*Alternate*)
Central Warehousing Corporation (CWC), New Delhi	Shri A. K. Malhotra Shri Sidharth Rath (*Alternate*)
CONCERT, Chennai	Shri R. Santhanam, IAS (Retd.) Shri G. Santhanarajan (*Alternate*)
Confederation of Indian Food Trade & Industry (CIFTI)-FICCI, New Delhi	Ms Parna Dasgupta Ms Priyanka Sharma (*Alternate*)
Confederation of Indian Industries (CII), New Delhi	Mr Manish Whorra Mr Aromal Jkoshi (*Alternate*)
Consumer Education & Research Centre, Ahmedabad	Mrs Dolly A Jani Dr Anindita Mehta (*Alternate*)
Consumer Guidance Society of India, Mumbai	Dr Sitaram Dixit Dr M. S. Kamath (*Alternate*)
Consumer Research, Education, Action, Training and Empowerment (CREATE)	Mr K. Suresh Kanna Sh R. Ponnamalam (*Alternate*)
Defence Food Research Laboratory (DFRL), Mysore	Dr G. K. Sharma Dr A. D. Semwal (*Alternate*)
ICAR - Indian Institute of Maize Research (IIMR), Ludhiana (formerly DMR)	Dr R. Sai Kumar Dr Dharam Paul Chaudhary (*Alternate*)
Directorate General of Supplies and Transport, Delhi	Col S. C. Joshi Maj Sonali Dudhane (*Alternate*)
Directorate of Marketing & Inspection, Faridabad	Dy Agricultural Marketing Advisor SMO (Std.) (*Alternate*)
Directorate of Plant Protection Quarantine & Storage, Faridabad	Plant Protection Adviser Shri R. V. Singh (*Alternate*)
Food Corporation of India (FCI), New Delhi	Mr A. S. Arunachalam Mr Sachin (*Alternate*)
Food Safety and Standards Authority of India, New Delhi	Ms Aprajita Verma

Organization	*Representative(s)*
G.B. Pant University, Food Science Division, Pant Nagar	Dr Satish K. Sharma Dr Sweta Rai (*Alternate*)
In personal capacity	Dr S. C. Khurana
In personal capacity	Shri I. C. Chaddha
Indian Grain Storage Management and Research Institute, Hapur	Director
Indian Institute of Food Processing Technology (IIFPT), Thanjavur	Dr C. Anandharamakrishnan
Indian Institute of Packaging (IIP), Delhi	Mr Deepak Khedkar Mr Madhab Chakraborty (*Alternate*)
Ministry of Consumer Affairs, Food & Public Distribution, New Delhi	Dr Subhash Gupta Dr S. C. Bansal (*Alternate*)
National Institute of Food Technology Entrepreneurship & Management (NIFTEM), Sonipat	Dr Ashutosh Upadhyay Dr Rupesh Chavan (*Alternate*)
National Institute of Nutrition (NIN), Hyderabad	Dr K. Bhaskara Chary Dr V. Sudershan Rao (*Alternate*)
National Sugar Institute (NSI), Kanpur	Dr V. P. Srivastava
Protein Foods and Nutrition Development Association of India (PFNDAI)	Dr Shatadru Sengupta Dr Jasvir Singh (*Alternate*)
Vasantdada Sugar Institute (VSI), Pune	Dr Rajeev V. Dani Dr Sanjeev V. Patil (*Alternate*)
Warehousing Development and Regulatory Authority (WDRA), New Delhi	Dr Radhey Krishna Tripathi

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